

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Appln. No: 10/523,771
Appellant: Martyn V. Twigg
Filed: March 24, 2006
Title: EXHAUST SYSTEM FOR A LEAN-BURN IC ENGINE
T.C./A.U.: 3748
Examiner: Binh Q. Tran
Confirmation No.: 5712
Docket No.: JMYT-341US

APPEAL BRIEF

Mail Stop Appeal Brief - Patents

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Responsive to the Final Office Action dated April 19, 2007 and the Advisory Action dated October 9, 2007, Appellant is submitting this Appeal Brief for the above-identified application. Appellant hereby requests reconsideration and reversal of the Final Rejection of claims 1-21.

In compliance with 37 C.F.R. § 41.37(a)(1), this Brief is being filed within the time allowed for response to the action from which the Appeal was taken or within two months from the date of the Notice of Appeal, whichever is later, namely by December 18, 2007.

The fees for filing a Brief in support of an Appeal under 37 C.F.R. § 41.20(b)(2), together with any extension fee required in connection with the filing of this Brief, are provided herewith.

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I. REAL PARTY IN INTEREST

The real party in interest is Johnson Matthey Public Limited Company.

II. RELATED APPEALS AND INTERFERENCES

There are no prior or pending appeals, interferences or judicial proceedings known to Appellant, the Appellant's legal representative, or assignee which may be related to, directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

III. STATUS OF CLAIMS

Claims 1-21 are pending and stand finally rejected. Claims 1-21 are appealed.

IV. STATUS OF AMENDMENTS

An amendment subsequent to the Final Rejection was filed on September 19, 2007. That amendment has been entered for purposes of appeal.

V. SUMMARY OF CLAIMED SUBJECT MATTER

The claimed invention, as set forth in independent claim 1, relates to an exhaust system for a lean-burn internal combustion engine. (Specification at page 1, lines 1-2). Citations to the specification providing support for the recited claim limitations are stated in this section in parentheses. An exemplary embodiment of the exhaust system, shown as cartridge 22, includes a soot filter 30, as shown in FIG. 1 packed with a mass of elongate, flat, narrow strip metal (specification at page 7, lines 5-6 and line 2); wherein said mass is compressed to provide a first packing density (specification at page 7, lines 6-7); and a catalyst (catalyst bed shown in FIG. 1 as 24) located upstream of the filter (specification at page 7, lines 1-4) for oxidising NO to NO₂ (specification at page 7, line 21) to combust soot collected on the filter in NO₂ (specification at page 7, lines 22-23). Claim 1 also recites that the catalyst is supported on a metal substrate of the type used in the filter (specification at page 7, line 2) having a second packing density lower than the first packing density (specification at page 7, line 3) to permit passage of soot particles (specification at page 7, line 22-23).

With respect to dependent claim 10, the exhaust system includes the feature that the metal of the filter is Type 300 or Type 400 stainless steel. (Specification at page 3, lines 1-3).

Regarding dependent claim 11, the exhaust system includes the feature that the metal from which the filter is made comprises an iron alloy containing at least 11.5% Cr, 4% Al and 0.02-0.25% minor constituents such as rare earth, zirconium or hafnium. (Specification at page 3, lines 5-7).

With respect to dependent claim 12, the exhaust system includes the feature that the width of the metal strip of the filter is up to 2 mm and its thickness is 0.2 to 0.8 times its width. (Specification at page 3, lines 11-14).

Regarding dependent claim 13, the exhaust system includes the feature that the flat, narrow strip metal is a flattened wire. (Specification at page 3, lines 17-18).

With respect to dependent claim 21, the exhaust system includes the feature wherein the width of the metal strip is in the range 0.1 to 0.5 mm. (Specification at page 3, lines 10-11).

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

A. Whether claims 1-10 and 13-20 are unpatentable under 35 U.S.C. § 102(e) as anticipated by U.S. Patent No. 5,665,322 (Kiyohide).

B. Whether claims 1-10 and 13-20 are unpatentable under 35 U.S.C. § 102(b) as anticipated by U.S. Patent No. 6,248,689 (Manson).

C. Whether claims 11, 12 and 21 are unpatentable under 35 U.S.C. § 103(a) as obvious over Kiyohide in view of design choice.

VII. ARGUMENT

A. Rejection Under 35 U.S.C. §102(e) Over Kiyohide

1) Rejection of Claims 1-10 and 13-20

Claims 1-10 and 13-20 stand rejected under 35 U.S.C. § 102(e) as anticipated by U.S. Patent No. 5,665,322 (Kiyohide). It is respectfully submitted, however, that the pending claims are patentable over Kiyohide for at least the reasons set forth below.

In the following paragraphs of this subsection, Appellant will present arguments showing that Appellant's claimed soot filter "packed with a mass of elongate, flat, narrow strip metal compressed to provide a first packing density and . . . wherein the catalyst is supported on a metal substrate of the type used in the filter having a second packing density lower than said first packing density" is not anticipated by Kiyohide. Specifically, in contrast to Appellant's soot filter, Kiyohide is distinguishable because it discloses a ceramic, foam-type filter, which includes a low density portion and a high-density thin layer portion formed from a ceramic foam material or a composite of ceramic powder and a binder.

Independent claim 1 recites:

"An exhaust system for a lean-burn internal combustion engine comprising
a soot filter packed with a mass of elongate, flat, narrow strip metal wherein said mass is compressed to provide a first packing density and
a catalyst located upstream of the filter for oxidising NO to NO₂ for combusting soot collected on the filter in NO₂,
wherein the catalyst is supported on a metal substrate of the type used in the filter having a second packing density lower than said first packing density, to permit passage of soot particles."

The Office asserts that Kiyohide discloses:

an exhaust system (Abstract) for a lean-burn combustion engine comprising a soot filter packed with a mass of elongate, flat, narrow

strip metal wherein the mass is compressed to provide a first packing density (**High Density**) (e.g. See col. 3, lines 50-67; col. 4, lines 1-42), and a catalyst located upstream of the filter for oxidising NO to NO₂ for combusting soot collected on the filter in NO₂, wherein the catalyst is supported on a metal substrate of the type used in the filter having a second packing density (**Low Density**) lower than the first packing density, to permit the passage of soot particles (e.g. See Claims 3-8; col. 15, lines 1-67; col. 16-17, lines 1-67; col. 18, lines 1-60). (Office Action, page 3).

Anticipation requires that each and every limitation of the claim be disclosed, either expressly or under principles of inherency, in a single prior art reference. *In re Robertson*, 49 USPQ2d 1949, 1950-51 (Fed. Cir. 1999). Absence from the reference of any claimed limitation negates anticipation. *Rowe v. Dror*, 42 USPQ2d 1550, 1553 (Fed. Cir. 1997).

Appellant respectfully disagrees with the Office and submits that Kiyohide fails to teach, disclose or suggest at least the features of a "soot filter packed with a mass of elongate, flat, narrow strip metal wherein said mass is compressed to provide a first packing density and . . . wherein the catalyst is supported on a metal substrate of the type used in the filter having a second packing density lower than said first packing density"

Contrary to the Office's assertion, there is no teaching, disclosure or suggestion in Kiyohide of these features. In the Office Action, at page 3, the Office cites to large portions of the specification with little guidance as to what specific aspects or elements disclosed in Kiyohide are considered to anticipate the features of Appellant's invention as claimed. Turning to the passages of Kiyohide, as cited by the Office, Kiyohide discloses a method of cleaning an exhaust gas using an exhaust gas cleaner having a heat-resistant, porous foam-type filter as a carrier. (Col. 3, lines 51-53). The filter is constituted by two portions consisting of a portion having relatively low density and a high-density, thin layer portion formed on one side of the low-density portion. (Col. 3, lines 54-56). The low-density portion supports certain specified catalysts and the high-density portion supports a platinum-group element catalyst. (Col. 3, lines 62-64). The low-density portion is located on the exhaust gas inlet side of the filter, and the high-density, thin layer portion is located on the exhaust gas outlet side of the filter. (Col. 3, lines 64-66). Constituents of the exhaust gas are oxidized in the high-density, thin layer and

reduced in the low-density portion. (Col. 4, lines 1-4). Other similar embodiments are disclosed.

Moreover, as disclosed in Kiyohide, the high-density thin layer portion is formed by either pouring a slurry of ceramic foam material into a mold, drying and then sintering the molded product, or by coating a mixture of ceramic powder such as cordierite and an organic binder, then drying and sintering the composite filter. In neither case, Appellant submits, is the resulting product a filter "packed with a mass of elongate, flat, narrow strip metal wherein said mass is compressed to provide a first packing density and . . . wherein the catalyst is supported on a metal substrate of the type used in the filter having a second packing density lower than said first packing density, to permit passage of soot particles." Kiyohide fails to teach, disclose or suggest that either of its lower and its higher density portions are compressed to provide a first packing density and a second packing density, nor do they include "a mass of elongate, flat, narrow strip metal." Rather its high density portion is either a composite layer or a dried and sintered slurry layer.

Based on this understanding of Kiyohide, claim 1 is not anticipated. As claimed in claim 1, the exhaust system requires a soot filter packed with a mass of elongate, flat, narrow strip metal wherein the mass is compressed to provide a first packing density. As set forth in Appellant's specification at page 7, lines 1-3, an exemplary embodiment according to the claimed invention includes cartridge 22 with catalyst bed 24 "**packed with knitted 310 stainless steel flattened wire** 0.33 mm wide and 0.2 mm thick to 6% volume by volume. . . ." (emphasis added). Further, "the next downstream zone of cartridge 22 is occupied by annular feed channel 28 surrounding first filter 30 **packed with the same flattened wire** as in bed 24, but at 12% volume by volume" (emphasis added) (Page 7, lines 5-7). These are descriptions of an exemplary embodiment of Appellant's claimed invention, but are referred to here to emphasize the profound differences between Appellant's claimed invention and the filter of Kiyohide which does not comprise a filter "packed with a mass of elongate, flat, narrow strip metal" which is "compressed to provide a first packing density."

Examples of the types of soot filter structures claimed by Appellant are expressly disclosed in U.S. Patent Nos. 4,270,936 (the '936 patent) and 4,902,487

(the '487 patent), among other literature, as set forth in the present application. (See page 1, lines 6-8). Such filters are distinguishable as an alternative to other types of filters, such as wall-flow filters, as described in both the present application, at page 1, lines 4-5, and in the '487 patent, at col. 3, lines 15-20. Significantly, the '487 patent also states that such a filter is an alternative to a ceramic foam filter. (See col. 3, line 15-20). Accordingly, Appellant's soot filter packed with a mass of elongate, flat, narrow strip metal, notwithstanding the other features of the system of claim 1, is expressly differentiated by Appellant from a ceramic foam filter with its attendant channel walls, in contradistinction to the Office's assertions.

Appellant respectfully submits that the claims must be read in the context of the specification and not in a vacuum. *In re Marosi*, 710 F.2d 799, 802, 218 U.S.P.Q. 289, 292 (Fed. Cir. 1983) (quoting *In re Okuzawa*, 537 F.2d 545, 548, 190 U.S.P.Q. 464, 466 (C.C.P.A. 1976)) ("Claims are not to be read in a vacuum, and limitations therein are to be interpreted in light of the specification in giving them their 'broadest reasonable interpretation'.") (emphasis in original). Appellant contends, therefore, that Kiyohide's ceramic foam filter cannot, therefore, read on Appellant's claimed soot filter packed with a mass of elongate, flat, narrow strip metal. As a result, Appellant submits that Kiyohide does not anticipate Appellant's soot filter as claimed.

Furthermore, Appellant submits that Kiyohide cannot anticipate Appellant's invention as claimed in claim 1, as asserted by the Office, for at least the following additional reason. Appellant submits that Kiyohide fails to teach, disclose or suggest a soot filter packed with a mass of elongate, flat, narrow strip metal. Specifically, as disclosed at col. 1, lines 61-63 for example, "with respect to filter structure *per se*, there are two types of filters, a ceramic honeycomb filter and a ceramic foam filter." According to Kiyohide, the first, second and third exhaust gas cleaners each are described as including a heat-resistant foam-type filter as a carrier. (See col. 2, lines 42-67). Throughout Kiyohide, these foam-type filters are defined as being of ceramic materials. (See e.g., col. 6, lines 50-56 and Examples). Further, Kiyohide discloses that its ceramic filters' high-density, thin layer portion is formed by a slurry of ceramic foam material molded, dried and sintered, or, is a uniform ceramic material coated with a mixture of ceramic powder

that is dried and sintered. (See col. 6, lines 57 to col. 7, line 2). As disclosed in these passages and throughout the specification, the filter is thus described as a ceramic filter without any disclosure or contemplation that its filter or whatever the Office deems to be the "packed mass of elongate, flat narrow strip" material are metal. Such ceramic filters, including ceramic filters with high-density portions formed by ceramic material, cannot anticipate the mass of elongate, flat, narrow strip metal of Appellant's filter of claim 1. Accordingly, the rejection based on Kiyohide must be withdrawn.

Appellant respectfully requests reconsideration and reversal of the rejection of claims 1-10 and 13-20 under 35 U.S.C. §102(e) based on Kiyohide.

2) Rejection of Claims 10 and 13

Notwithstanding the lack of teaching of Kiyohide as discussed above, Appellant fails to find where Kiyohide disclosures the features of claims 10 and 13, even with the aid of the citations presented by the Office. The Office asserts that Kiyohide discloses that the metal of the filter is Type 300 or Type 400 stainless steel (claim 10) or that the flat, narrow strip metal is a flattened wire (claim 13) by providing the following citations: claims 3-8; col. 15, lines 1-67; col. 16-17, lines 1-67; and col. 18, lines 1-60. Kiyohide clearly does not disclose these features at these citations, nor is there such disclosure anywhere else in the reference of the use of steel or metal in any context for Kiyohide's ceramic filter substrate. Appellant submits that these claims, therefore, cannot be anticipated by Kiyohide and the rejection of these claims must also be withdrawn for these additional reasons.

Moreover, Appellant submits that claim 13 is dependent upon claim 12. Claim 12 has not been rejected by the Office as anticipated by Kiyohide. For this additional reason, the rejection of claim 13 as anticipated by Kiyohide is improper and must be withdrawn. The patentability of claims 10 and 13 is being argued separately.

B. Rejection Under 35 U.S.C. §102(b) Over Manson

Claims 1-10 and 13-20 stand rejected under 35 U.S.C § 102(b) as anticipated by Manson. It is respectfully submitted, however, that the pending claims are patentable over Manson for at least the reasons set forth below.

In the following paragraphs in this section, Appellant will present arguments showing that Appellant's claimed soot filter "packed with a mass of elongate, flat, narrow strip metal compressed to provide a first packing density and . . . wherein the catalyst is supported on a metal substrate of the type used in the filter having a second packing density lower than said first packing density" is not anticipated by Manson. Specifically, in contrast to Appellant's soot filter, Manson is distinguishable because Manson discloses a wall-flow type filter, which filter includes internal cells walls, not a packed mass of elongate, flat narrow strip metal, that are nowhere disclosed as compressed to provide a first packing density.

Independent claim 1 recites:

"An exhaust system for a lean-burn internal combustion engine comprising
a soot filter packed with a mass of elongate, flat, narrow strip metal wherein said mass is compressed to provide a first packing density and
a catalyst located upstream of the filter for oxidising NO to NO₂ for combusting soot collected on the filter in NO₂,
wherein the catalyst is supported on a metal substrate of the type used in the filter having a second packing density lower than said first packing density, to permit passage of soot particles."

The Office asserts that Manson discloses:

an exhaust system (e.g. Fig. 3-4) for a lean-burn internal combustion engine comprising a soot filter (e.g. 152, 174) packed with a mass of elongate, flat, narrow strip metal wherein the mass is compressed to provide a first packing density, and a catalyst (e.g. 150, 170) located upstream of the filter (e.g. 152, 174) for oxidising NO to NO₂ for combusting soot collected on the filter in NO₂, wherein the catalyst is supported on a metal substrate of the type used in the filter having a second packing density lower than the first packing density lower than

the first packing density, to permit passage of soot particles (e.g. See Figs. 3-4; col. 6, lines 50-67; col. 7, lines 1-63).

Anticipation requires that each and every limitation of the claim be disclosed, either expressly or under principles of inherency, in a single prior art reference. *In re Robertson*, 49 U.S.P.Q.2d 1949, 1950-51 (Fed. Cir. 1999). Absence from the reference of any claimed limitation negates anticipation. *Rowe v. Dror*, 42 U.S.P.Q.2d 1550, 1553 (Fed. Cir. 1997).

As claimed in claim 1, the exhaust system requires a soot filter packed with a mass of elongate, flat, narrow strip metal wherein the mass is compressed to provide a first packing density. Appellant submits that a monolith substrate, even a metal one, does not include such features.

As noted above, an exemplary embodiment according to Appellant's claimed invention includes cartridge 22 with catalyst bed 24 "**packed with knitted 310 stainless steel flattened wire** 0.33 mm wide and 0.2 mm thick to 6% volume by volume. . . ." (emphasis added). Further, "the next downstream zone of cartridge 22 is occupied by annular feed channel 28 surrounding first filter 30 **packed with the same flattened wire** as in bed 24, but at 12% volume by volume" (emphasis added) (Page 7, lines 5-7). Examples of such filters are expressly disclosed in U.S. Patent Nos. 4,270,936 and 4,902,487. More importantly, wall-flow filters such as that of Manson, are expressly distinguished as an alternative to, i.e. not the same as, the metal soot filter of Appellant's claim 1, in both the present application, at page 1, lines 4-5, and in the '487 patent at col. 3, lines 15-20. Accordingly, the filter packed with a mass of elongate, flat, narrow strip metal is expressly differentiated by Appellant from the wall-flow filter that the Office alleges anticipates the soot filter of claim 1. Appellant submits that such an interpretation is unreasonably broad and is taken out of the context of Appellant's application.

Contrary to Appellant's invention recited in claim 1, Manson, such as shown in Figure 1, discloses that support 100 includes longitudinal passageways 106 and adjacent passageways 110. The support can be metallic, as discussed at col. 6, lines 41-47. As further shown in Figure 3, the filter of Manson can have two stages, in which the channels 164 of the second stage are smaller than the channels of the first stage 156. Appellant contends, however, that such channels

cannot be considered "a mass of elongate, flat, narrow strip metal wherein said mass is compressed to provide a first packing density." Specifically, there is no teaching or suggestion in Manson that such internal cell walls are in any way compressed to provide a first packing density, nor that of a substrate of the type used in the filter having a second packing density lower than the first packing density elsewhere in the system. Merely including internal channels in the substrate monolith such that the channels are surrounded by walls cannot be interpreted to mean that they are a mass of elongate, flat, narrow strip metal compressed to provide a first packing density. Such an interpretation is unreasonably broad and inconsistent with the Appellant's claims and specification. Appellant submits, therefore, that the rejection is improper and must be withdrawn.

Because Manson does not disclose each and every limitation of the claimed invention, anticipation of the claimed invention by Manson has not been established. Appellant respectfully requests reconsideration and reversal of the rejection of claims 1-10 and 13-20 under 35 U.S.C. §102(b).

C. Rejection Under 35 U.S.C. §103(a) Over Kiyohide In View of Design Choice

1) Rejection of Claims 11, 12 and 21

Claims 11, 12 and 21 stand rejected under 35 U.S.C. § 103(a) as unpatentable over U.S. Patent No. 5,665,322 (Kiyohide) in view of design choice. It is respectfully submitted, however, that the pending claims are patentable over Kiyohide in view of design choice for at least the reasons set forth below in Section A of the Appeal Brief.

On April 30, 2007, the United States Supreme Court decided *KSR International Co. v. Teleflex Inc.*, 550 U.S. ____ (2007), opining on the standard of obviousness under 35 U.S.C. Section 103. Specifically, the Court addressed the Federal Circuit's analysis with respect to the teaching, suggestion and motivation (TSM) test. Ultimately, the Supreme Court rejected the Federal Circuit's "rigid approach" in that case. At the outset, however, the Federal Circuit reaffirmed that in dealing with the question of obviousness, the factors set forth in *Graham v. John*

Deere Co. of Kansas City, 383 U.S. 1 (1966) are those that "continue to define the inquiry that controls" the "framework for applying the statutory language of [Section] 103." *KSR*, Slip Opinion at 2.

In applying Section 103, the Supreme Court has directed the U.S. PTO to make underlying factual inquiries as stated in *Graham v. John Deere Co.*, 383 U.S. 1, 17-18 (1966), and as affirmed in *KSR International Co. v. Teleflex, Inc.*, 127 S. Ct. 1727 (2007), as follows:

- (1) Determining the scope and content of the prior art;
- (2) Ascertaining the differences between the claims at issue and the prior art;
- (3) Resolving the level of ordinary skill in the pertinent art; and
- (4) Evaluating evidence of secondary considerations.

In comparing the claimed invention and the prior art, a tenet which is highly significant to the prosecution of the present application is set forth in M.P.E.P. Section 2143.03. That is, to "establish *prima facie* obviousness of a claimed invention, all claim limitations must be taught or suggested by the prior art." *In re Rozka*, 490 F.2d 981, 180 U.S.P.Q. 580 (C.C.P.A. 1974). Claims 11, 12 and 21 are dependent on independent claim 1. For at least the reason that Kiyohide fails to disclose all of the features of claim 1, as discussed above in Section A, claims 11, 12 and 21 are also patentable over Kiyohide. It is respectfully submitted, therefore, that a *prima facie* case of obviousness has not been established with respect to claims 11, 12 and 21 and withdrawal of the rejection is respectfully requested.

2) Rejection of Claims 12 and 21

In the following paragraphs in this subsection, Appellant will show that the Office has failed to establish a *prima facie* case of obviousness based on Kiyohide in view of design choice. Specifically, the Office's rejections are both legally improper

and flawed on the basis of unsupported speculation, as opposed to being supported on factual evidence, as is required.

Appellant contends that the Office has failed to establish a *prima facie* case of obviousness for the rejection of pending claims 12 and 21. Specifically, Appellant contends that the Office has improperly rejected the claims based on the Office's view of what one of ordinary skill in the art would expect or conclude without any basis to support the assertions or conclusions reached. Instead, Appellant contends that the Office has improperly attempted to shift the burden to the Appellant, essentially requiring Appellant to affirmatively establish a *prima facie* case of non-obviousness.

As noted above, the Office has relied on "design choice" to supply features in the claims that the Office admits are not present anywhere in the cited references. The Office apparently leaps to the conclusion that it would have been an obvious design choice to modify the Kiyohide device to include Appellant's above-noted features because "there is nothing in the record which establishes the claimed parameters present a novel or unexpected result. (See *In re Kuhle*, 562 F.2d 553, 188 USPQ 7 (CCPA 1975))." (Office Action, page 9). Appellant contends, however, that such a burden is not required of Appellant. See *In re Glaug*, 283 F.3d 1335, 1338 (Fed. Cir. 2002) ("During patent examination the PTO bears the initial burden of presenting a *prima facie* case of unpatentability."); See also, *In re Oetiker*, 977 F.2d 1443, 1445 (Fed. Cir. 1992); *In re Piasecki*, 745 F.2d 745 F.2d 1468, 1472 (Fed. Cir. 1984). Further, "the Patent Office has the initial duty of supplying the factual basis for its rejection. It may not, because it may doubt that the invention is patentable, resort to speculation, unfounded assumptions or hindsight reconstruction to supply deficiencies in its factual basis." *In re Warner*, 379 F.2d 1011, 1017 (C.C.P.A. 1967), *cert. denied*, 389 U.S. 1057 (1968) (emphasis added).

As the Board of Patent Appeals and Interferences set forth in *Ex parte Levengood*,

[T]o establish a *prima facie* case of obviousness, it is necessary for the examiner to present evidence, preferably in the form of some teaching, suggestion, incentive or inference in the applied

prior art or in the form of generally available knowledge, that one having ordinary skill in the art would have been led to combine the relevant teachings of the applied references in the proposed manner to arrive at the claimed invention. *Ex parte Levengood*, 28 U.S.P.Q.2d. 1300, 1301 (Bd. Pat. App. & Int'f. 1993) (emphasis in original).

Appellant contends and as the Office concedes, none of the references teach, disclose or suggest the features of claims 12 and 21, namely:

12. A system according to claim 1, wherein the width of the metal strip of the filter is up to 2 mm and its thickness is 0.2 to 0.8 times its width.
21. A system according to claim 12, wherein the flat, narrow strip metal is a flattened wire.

Without any teaching in the cited references with respect to these features, the Office summarily concludes that it would have been an obvious matter of design choice for one of ordinary skill in the art to include these features, in combination with the other features claimed in claim 1, to achieve Appellant's invention. Appellant submits, however, that such an unsupported conclusion, without any factual evidence or any reference to support this conclusion, fails to meet the Office's burden of establishing a *prima facie* case of obviousness. Appellant contends that the Office's logic in this regard runs counter to the law on this subject. Only when a *prima facie* case of obviousness is made will it be incumbent upon Appellant to rebut such a *prima facie* case of obviousness, for example, by presenting secondary considerations, such as unexpected results.

Appellant contends that the Office's reliance on the recitation of caselaw at page 9 of the Action to support its obviousness rejection of claims 12 and 21 is flawed. The Office admits that Kiyohide does not disclose the features of claims 12 and 21. Therefore, it is not merely a difference of degree from the results of the prior art, as Kiyohide does not even disclose these features. Nor can it be the discovery of an optimum or workable range achieved by routine experimentation where the general conditions of a claim are disclosed; indeed, the Office admits the feature is not disclosed in Kiyohide. Appellant submits that Kiyohide is silent as to

these features because Kiyohide's device does not include a mass of elongate, flat, narrow strip metal. Such features including a width of the metal strip of the filter is up to 2 mm and its thickness is 0.2 to 0.8 times its width or the feature that the flat, narrow strip metal is a flattened wire, surely were not contemplated by Kiyohide, especially where the general condition of Appellant's claim is nowhere disclosed. Nor, Appellant contends, would it be a matter of simple "design choice" to apply or optimize such features to Kiyohide where Kiyohide lacks any disclosure relating to these features, or the feature of a flat, narrow, strip metal to begin with. Such features are not applicable in the context of Kiyohide's cell walls.

Appellant contends, and, as the Office admits, Kiyohide fails to disclose these features, and, therefore, the rejection is improper and contrary to the mandate of the Court of Appeals for the Federal Circuit in this regard.

According to the Federal Circuit, "rejections must be supported by substantial evidence in the administrative record and that where the record is lacking in evidence, [the Office] cannot and should not resort to unsupported speculation." *See generally, In re Lee*, 277 F.3d 1338 (Fed. Cir. 2002) and *In re Zurko*, 111 F.3d 887 (Fed. Cir. 1997). Appellant contends that the Office's rejections of the claims based on "design choice" are no more than unsupported speculation without any factual evidence other than the Office's own speculation and conjecture.

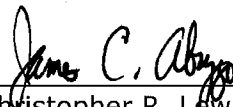
Each of the claimed variables must first be recognized as a result-effective variable before the determination of the optimum or workable ranges of the variable might be characterized as routine experimentation. *In re Antonie*, 559 F.2d 618 (C.C.P.A 1977). Thus far, the Office's only basis for asserting this argument is the Office's own unsupported conclusions, even where the Office admits that the cited art does not disclose such features. If the prior art has failed to recognize any general condition for the feature, Appellant contends that the Office cannot claim that the Appellant has merely optimized a design parameter through routine experimentation. In other words, if no evidence has been presented that the art recognizes the feature at all, it certainly cannot be deemed routine in the art to optimize the feature.

For at least the above reasons, Appellant contends that the Office has failed to establish a *prima facie* case of obviousness of claims 12 and 21. The patentability of these claims is being argued separately.

VIII. CONCLUSION

In view of the arguments set forth above, all pending claims are patentable over the cited references. The rejection of all of the pending claims of record should therefore be reversed with instructions to issue a Notice of Allowability. Such actions are respectfully requested.

Respectfully Submitted,



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CRL/JCA

Enclosures: Claims Appendix
Evidence Appendix
Related Proceedings Appendix

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The Commissioner for Patents is hereby authorized to charge payment to Deposit Account No. 18-0350 of any fees associated with this communication.

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APPENDIX OF CLAIMS

1. An exhaust system for a lean-burn internal combustion engine comprising a soot filter packed with a mass of elongate, flat, narrow strip metal wherein said mass is compressed to provide a first packing density and a catalyst located upstream of the filter for oxidising NO to NO₂ for combusting soot collected on the filter in NO₂, wherein the catalyst is supported on a metal substrate of the type used in the filter having a second packing density lower than said first packing density, to permit passage of soot particles.
2. A system according to claim 1, comprising, in order from upstream to downstream, a plurality of metal-based filters adapted successively to trap smaller and smaller particles.
3. A system according to claim 2, comprising at least one wall flow filter for trapping yet smaller particles.
4. A system according to claim 2, comprising a flow-through monolith between each pair of metal-based filters.
5. A system according to claim 4, wherein the or each flow-through monolith comprises a NO oxidation catalyst for restoring the NO₂ content, which had been decreased by reaction with soot in the preceding filter.
6. A system according to claim 1, wherein the filter capacity is sufficient to allow the soot to be combusted continuously by the oxidant.
7. A system according to claim 1, wherein the filter capacity is sized for accumulations of soot sufficient to increase pressure-drop significantly before the next period of fast running and the system includes a bypass, wherein the pressure-drop through which is equal to the design maximum tolerated pressure-drop through the filter, whereby to avoid engine stalling.
8. A system according to claim 7, comprising means to limit soot emission to atmosphere located downstream of the bypass, which means being selected

from the group consisting of a filter, an impingement collector and an oxidation catalyst.

9. A system according to claim 1, wherein the filter comprises a regular coiled, woven or knitted structure.
10. A system according to claim 1, wherein the metal of the filter is Type 300 or Type 400 stainless steel.
11. A system according to claim 1, wherein the metal from which the filter is made comprises an iron alloy containing at least 11.5% Cr, 4% Al and 0.02-0.25% minor constituents such as rare earth, zirconium or hafnium.
12. A system according to claim 1, wherein the width of the metal strip of the filter is up to 2 mm and its thickness is 0.2 to 0.8 times its width.
13. A system according to claim 12, wherein the flat, narrow strip metal is a flattened wire.
14. A system according to claim 1, wherein the filter packing carries a layer catalytic for soot oxidation.
15. A system according to claim 14, wherein the catalytic layer comprising a washcoat and a component selected from the group consisting of Pt and oxides of Cs and V.
16. A system according to claim 1, comprising means for generating a component for combusting soot collected on the filter selected from the group consisting of ozone and plasma.
17. An internal combustion engine comprising an exhaust system according to claim 1.
18. A diesel engine according to claim 17.
19. A system according to claim 3, comprising a flow through-monolith between each pair of metal-based filters.

20. A system according to claim 19, wherein the or each flow-through monolith comprises a NO oxidation catalyst for restoring the NO₂ content, which had been decreased by reaction with soot in the preceding filter.
21. A system according to claim 12, wherein the width of the metal strip is in the range 0.1 to 0.5 mm.

EVIDENCE APPENDIX

None

RELATED PROCEEDINGS APPENDIX

None